



Armed Forces College of Medicine AFCM



Meckel's diverticulum – Malabsorption – Diseases of Appendix- Hirschsprung's Disease



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Prof. of Pathology



By the end of this lecture you will

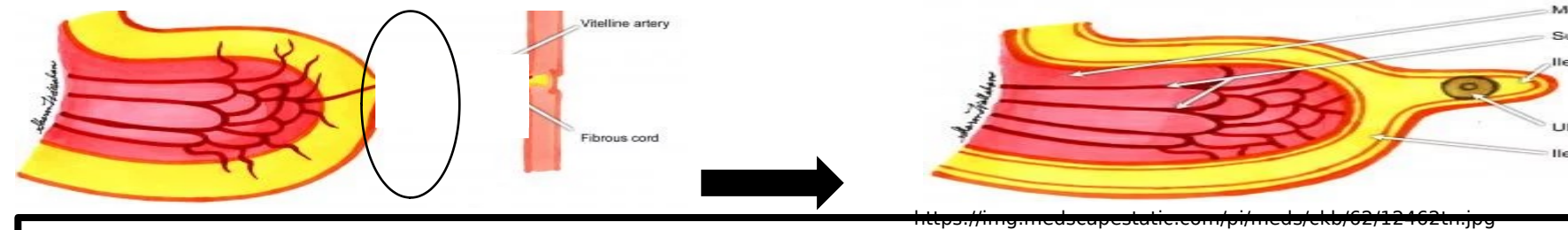
- Explain pathology and complications of Meckel's Diverticulum & Hirschsprung's disease
- Explain the pathology of some common causes of malabsorption syndrome (Celiac sprue ,Tropical sprue ,Whipple disease)
- Explain pathology and complications of common appendicular diseases
(acute appendicitis and carcinoid tumour)
- Correlate pathologic features of Meckel's diverticulum /Malabsorption /Hirschsprung's disease /Appendicular diseases with their clinical picture and complications
- Enumerate causes of bleeding per rectum

Lecture Plan



1. Part 1 (10 mins) :Meckel's diverticulum
2. Part 2 (20 mins): Malabsorption -Hirschsprung's Disease
3. Part 3 (20 mins): Appendicular diseases
4. Lecture Quiz (5 min)

Meckel's diverticulum

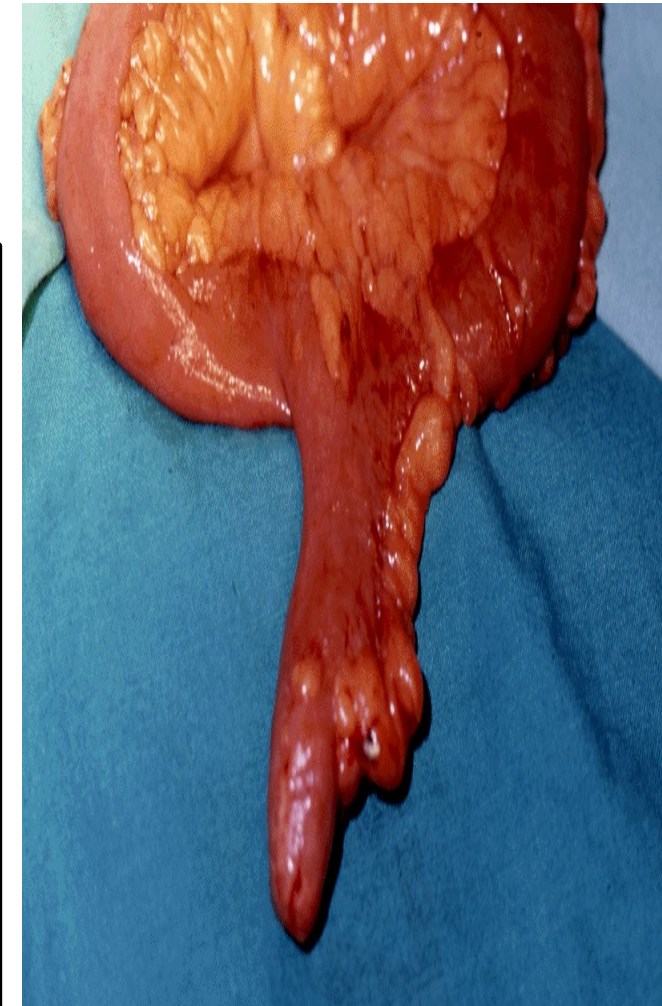


Def:

- **Most common congenital anomaly of small intestine.**
- Due to incomplete obliteration of vitello-intestinal duct
- Blind-ended pouch
- Lumen communicates with lumen of gut

C/P:

- Intestinal bleeding



<https://i.pinimg.com/originals/02/29/c4/0229c4c6ce89dc80f707aabda5a705aa.jpg>

Meckel's diverticulum



Gross :

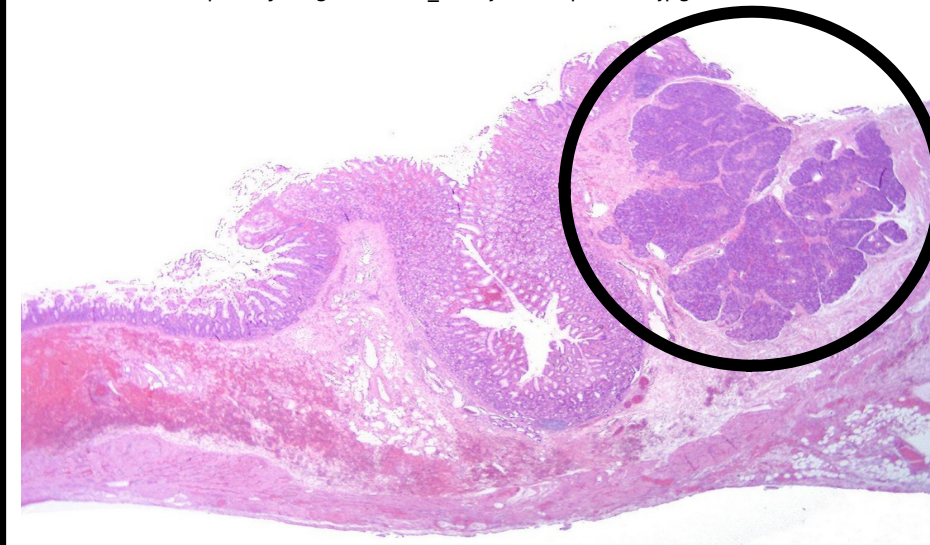
- At antimesenteric border of ileum
- Occur in \approx 2% of the population
- Present 2 feet (85 cm) away from ileocecal valve
- Approximately 2 inches (5 cm) long

Mic:

- Mucosa, submucosa & muscularis propria simulate that of small intestine +
- Heterotopic tissue : gastric, pancreatic or biliary tissue.



https://i.ytimg.com/vi/S_57cLjP3FI/hqdefault.jpg



<https://pbs.twimg.com/media/C65QVRUWsAlxpOy.jpg>

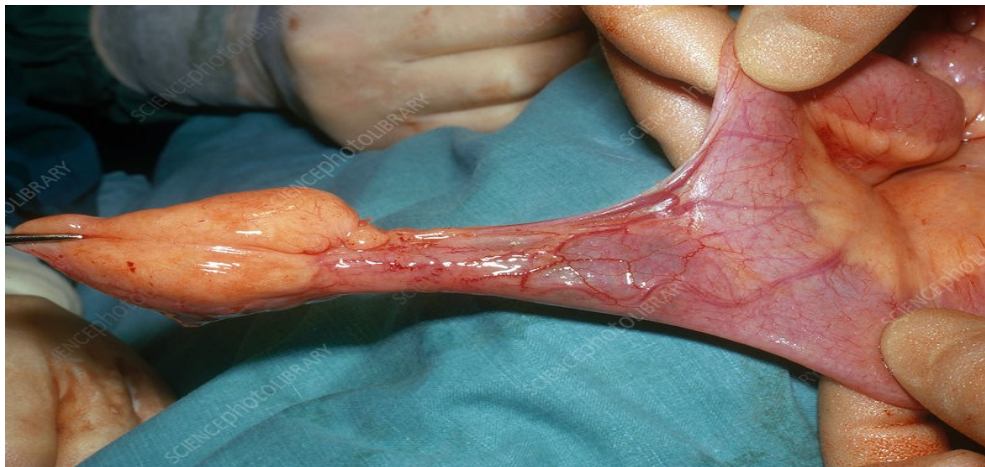
Meckel's diverticulum



Complications:

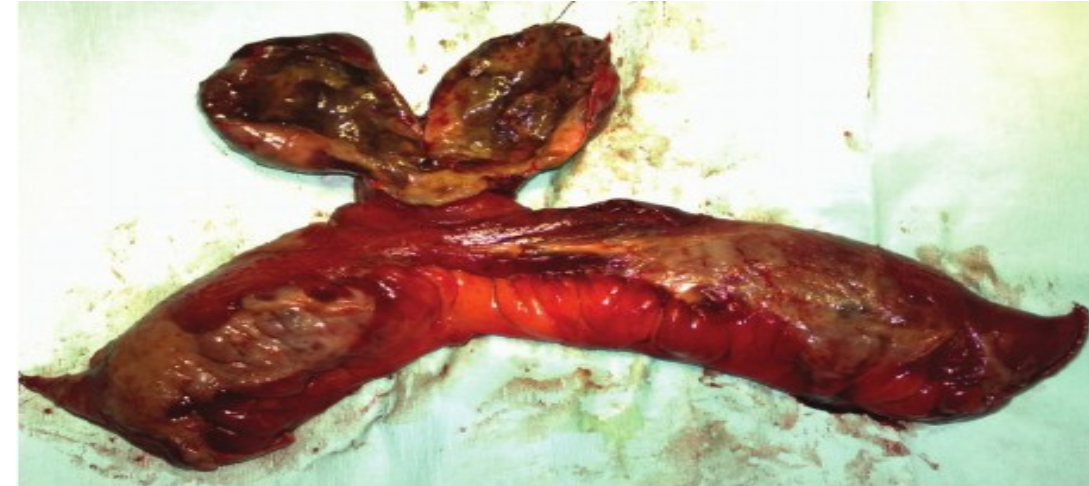
1. Diverticulitis simulating appendicitis
2. Perforation
3. Intussusception or Volvulus

1-Diverticulitis



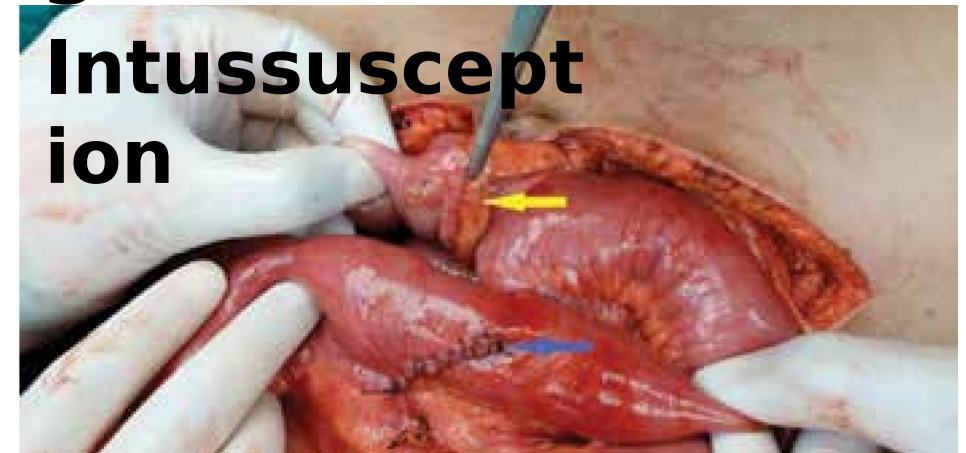
<https://media.sciencephoto.com/image/c0144430/800wm>

2-Perforation



https://www.researchgate.net/profile/A_Marinis/publication/264623094/figure/fig2/AS:296025119051779@1447589296103/The-perforated-Meckels-diverticulum.png

3-Intussusception



GIT & Metabolism module

<https://d3i71xahurhd42.cloudfront.net/3fa6b618e3a3e31e830cb0e3f5dc02125117d1ac/2-Figure3->

Malabsorption



Def:

Clinical conditions in which there is **defective absorption** of one or more important nutrients

C/P:

- Stools :bulky- full of fat-frothy -offensive (due to excessive fermentation)
- Abdominal distention.
- Osteoporosis, rickets (low blood calcium).
- Anemia (deficiency of iron, folic acid or vitamin B₁₂.)
- Bleeding (vitamin K deficiency.)

Malabsorption



Causes :

A- Defective Intra luminal Digestion (lumin~~X~~al phase) eg:

- Pancreatic insufficiency
- Extensive surgical resection

B-Primary Mucosal Cell Abnormalities (intestina~~X~~l phase)

eg:

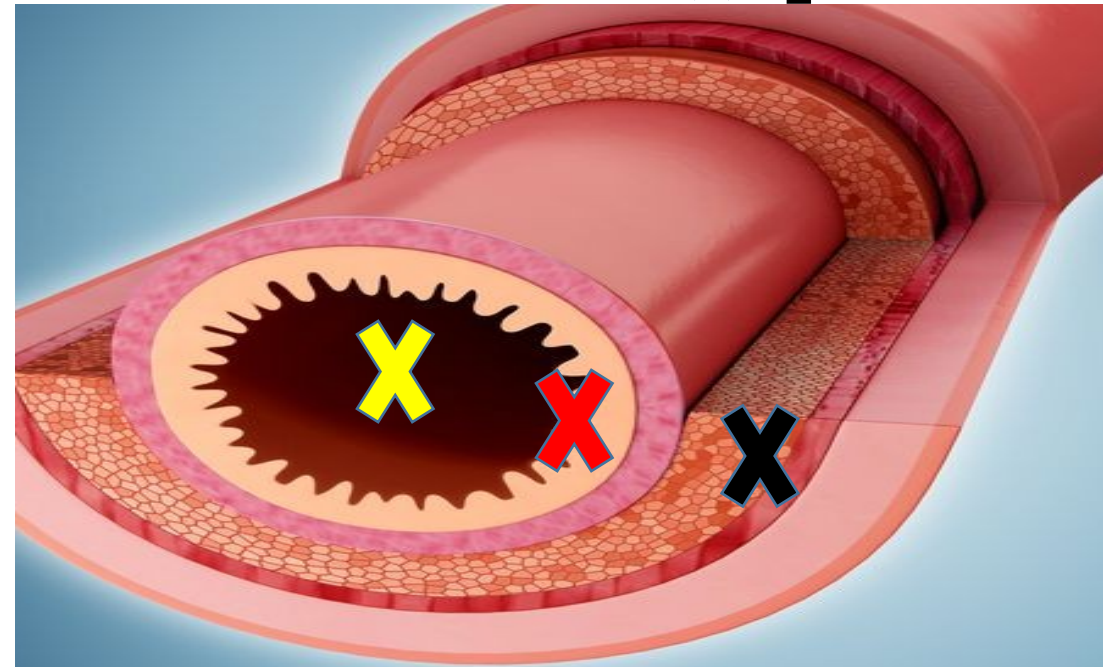
- Celiac disease
- Crohn's disease

C-Infections eg:

- Parasitic infestation
- Tropical sprue
- Whipple disease~~X~~



D- Lymphatic Obstruction



Celiac disease = Celiac sprue = gluten sensitive enteropathy



Incidence:

- Most important cause of malabsorption
- Common in children but occurs in adults

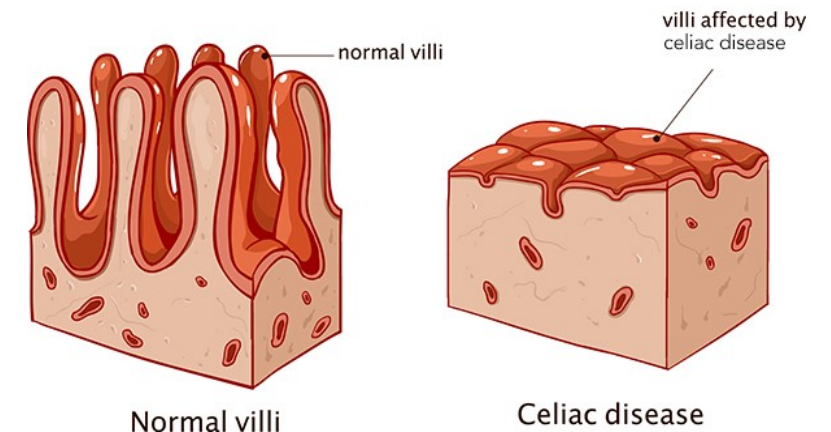
Pathogenesis

- **Immune-mediated enteropathy due to sensitivity to gluten** in cereal products
- **T cells reaction & antibodies** produced against gluten destroy enterocytes



<http://www.todayifoundout.com/wp-content/uploads/2014/03/mmmmm-gluten.jpg>

CELIAC DISEASE

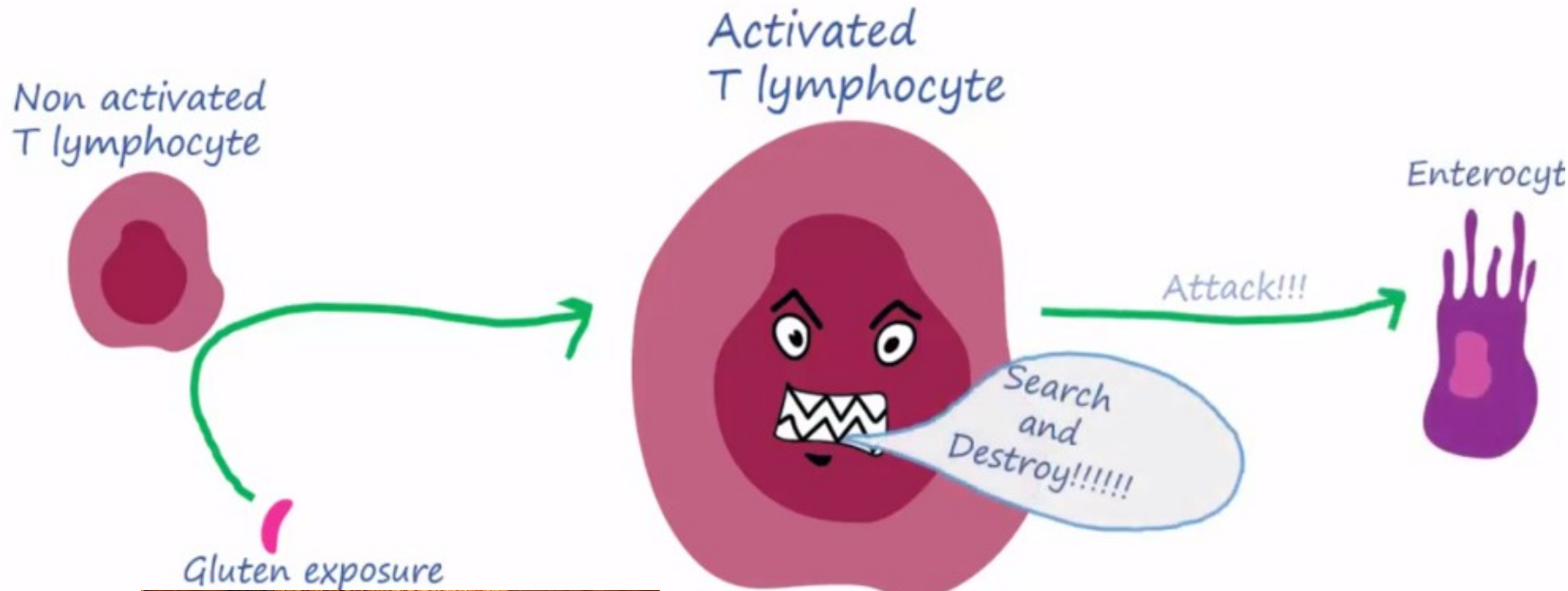


<https://www.beyondceliac.org/wp-content/uploads/2019/09/what-is-celiac-disease-villi-q>

Celiac disease = Celiac sprue = gluten sensitive enteropathy

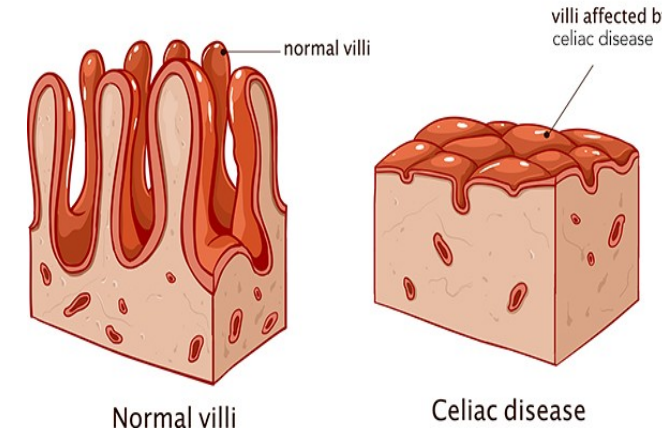


Immune-mediated destruction



<https://youtu.be/q-lroyk-v3k>

CELIAC DISEASE



<https://www.beyondceliac.org/wp-content/uploads/2019/09/what-is-celiac-disease-villi-gluten-celiac.jpg>

Celiac disease = Celiac sprue = gluten sensitive enteropathy



C/P:

of malabsorption (see before)

Mic:

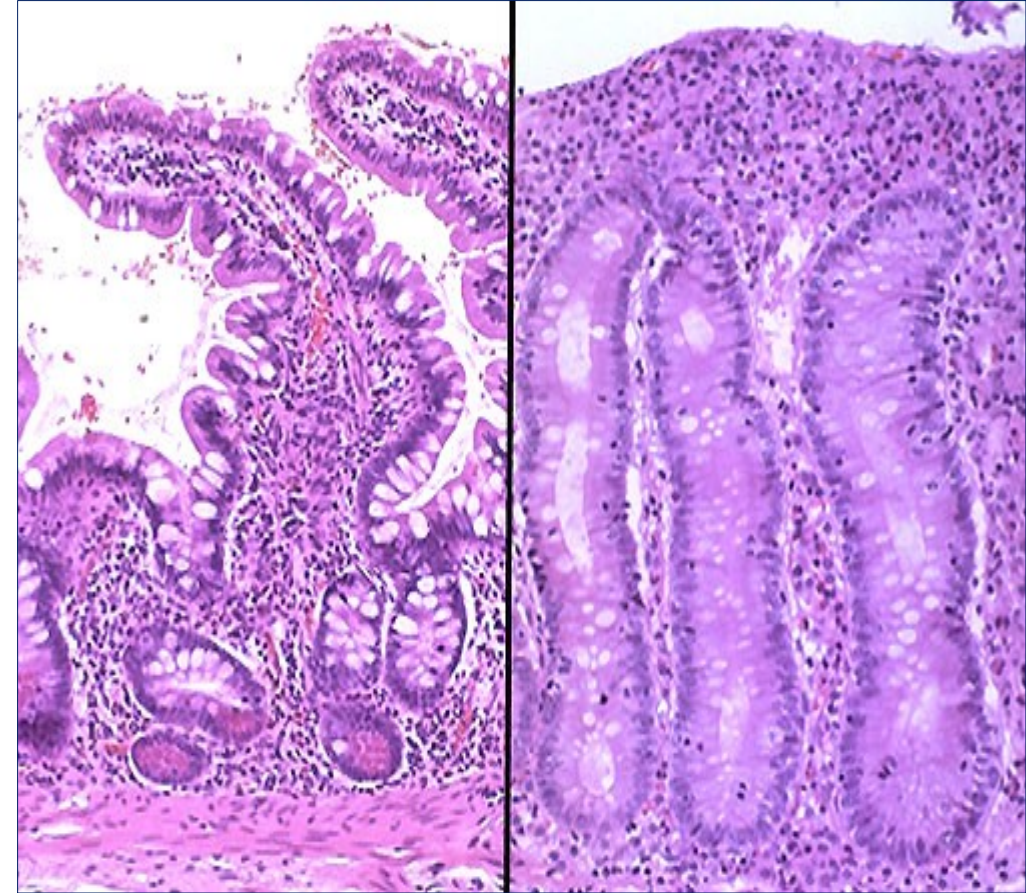
- Intraepithelial lymphocytic infiltrate
- Total Villous atrophy

Complication:

- Small intestinal T-cell lymphoma (rare)
- Intestinal adenocarcinoma (rare)

TTT:

Gluten-free diet.



<https://library.med.utah.edu/WebPath/jpeg4/GI152.jpg>

Tropical Sprue

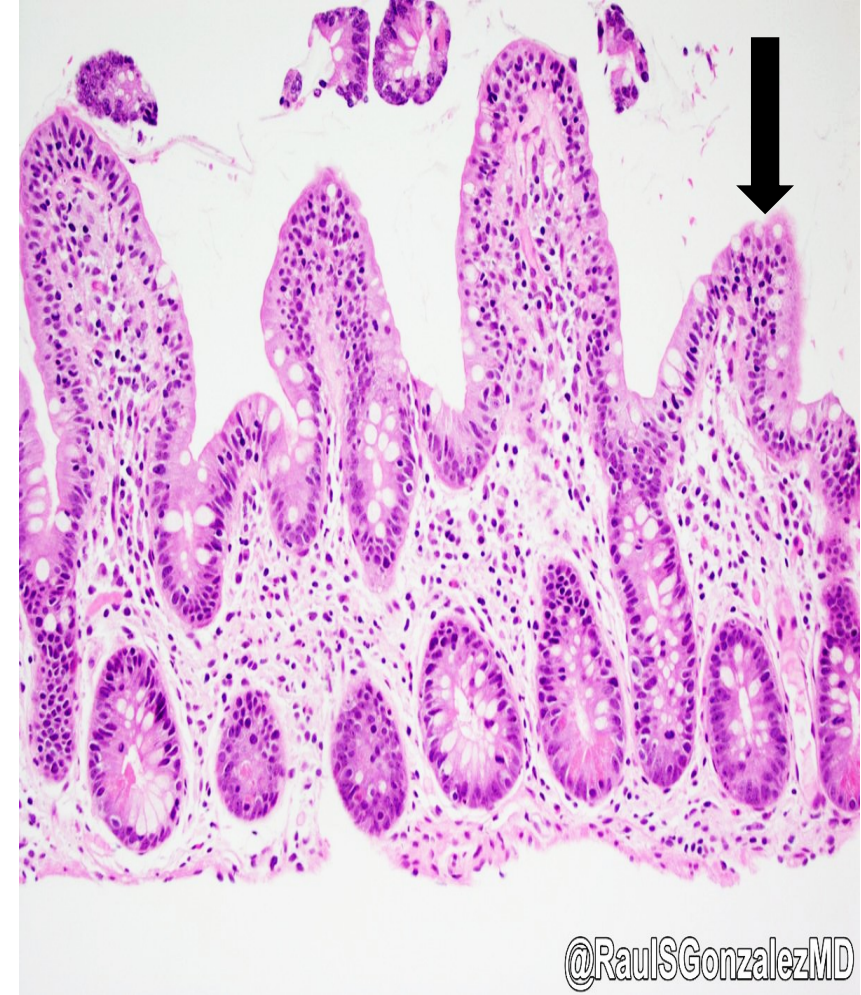


Pathogenesis

- Due to chronic intestinal **bacterial Infection**
- (organism not yet identified)
- Not related to Gluten

Mic

- Partial villous atrophy
- Lymphocytic infiltration of the villi



@RaulSGonzalezMD

<https://pbs.twimg.com/media/DiPqiSpXkAAzzwF.jpg>

Whipple Disease



Pathogenesis

- **Defective T-lymphocyte** function predispose to
- Infection by **Rod shaped bacilli** (Tropheryma whippelii)
- May affect any organ commonly
 - **Small intestine**
 - Mesenteric lymphadenopathy-
 - Others (CNS)

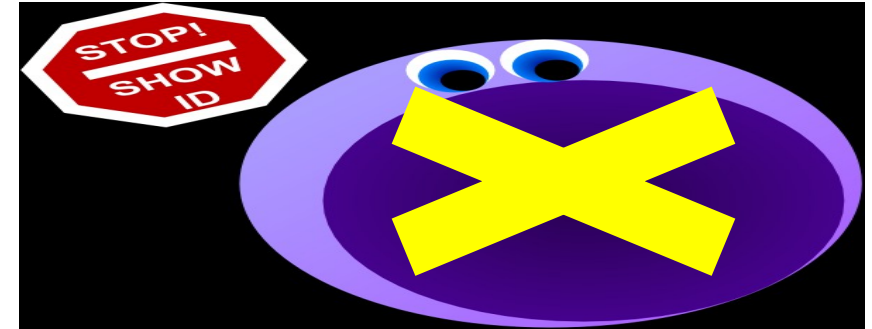
C/P:

Malabsorption (see before)

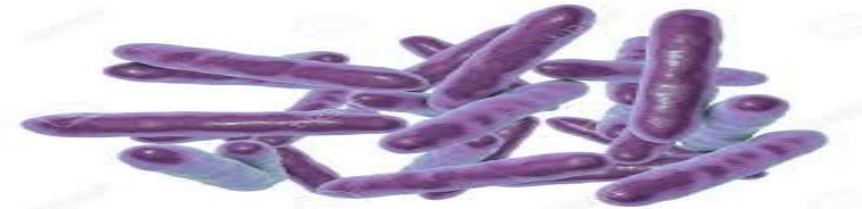
Mic :

Periodic acid-Schiff (PAS-positive)

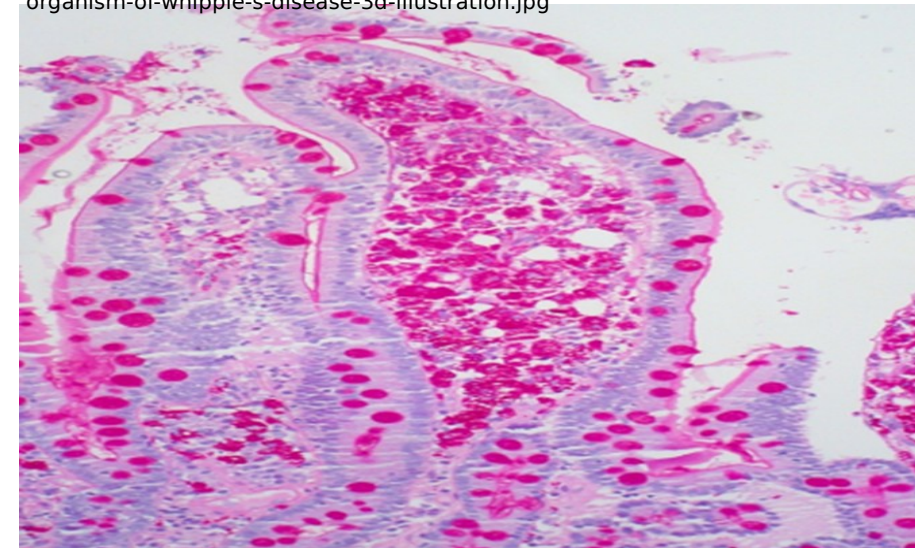
macrophages in intestinal mucosa



<http://www.clker.com/cliparts/M/s/l/W/H/Y/cartoon-t-cell-hi.png>



<https://previews.123rf.com/images/drmicrobe/drmicrobe1805/drmicrobe180500122/101756141-tropheryma-whippelii-bacteria-the-causative-organism-of-whipple-s-disease-3d-illustration.jpg>



https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRP5Eb7A4_2b1ZeDww-TA_ZhvNA_0eEG6DmiMY_7P67oopTUgF3

Hirschsprung's Disease (Congenital Megacolon)



Def:

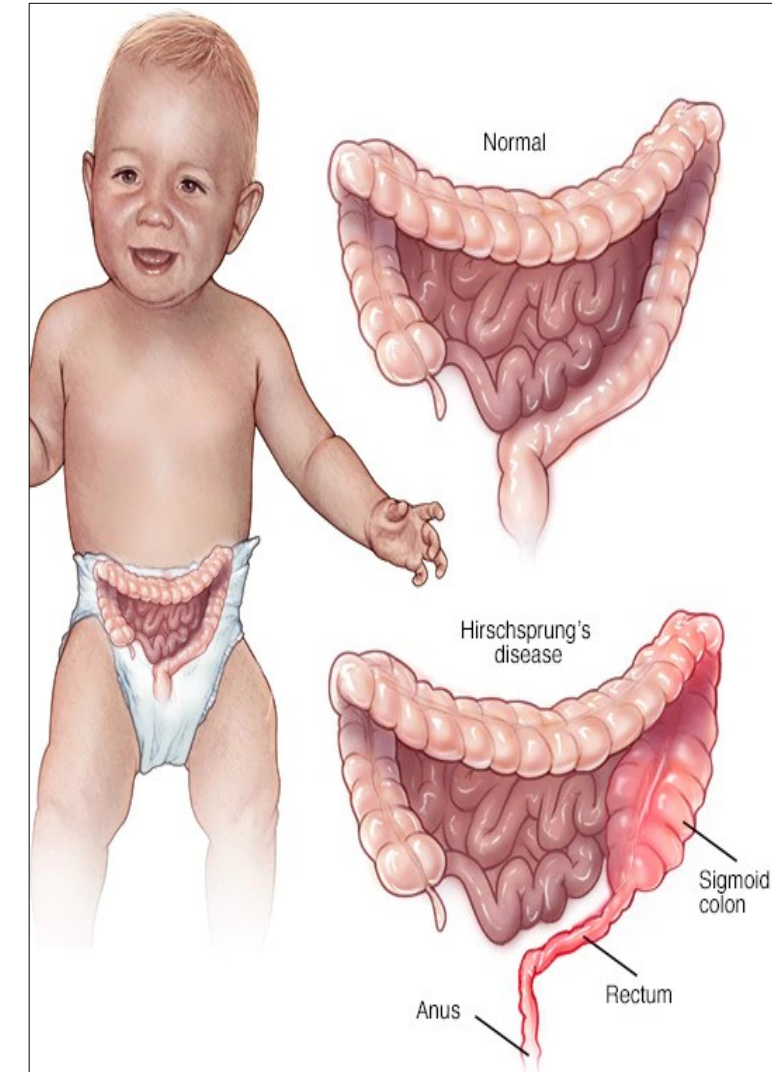
- Familial congenital disorder
- Colonic dilatation due to defect in innervation of rectum.

Pathogenesis:

- Arrested migration of neural crest cells into gut (proximal to distal)
- Generates a congenital **aganglionic** distal segment with functional obstruction & proximal dilatation.

C/P:

- **Failure of passage of meconium in neonates**
Chronic intestinal obstruction > > **constant constipation**



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https://www.mayoclinic.org/-/media/kcms/gbs/patient-consumer/images/2013/08/26/10/21/ds00825_im04775_mcdc7_hirschsprungs_diseasethu.jpg.jpg

Hirschsprung's Disease (Congenital Megacolon)



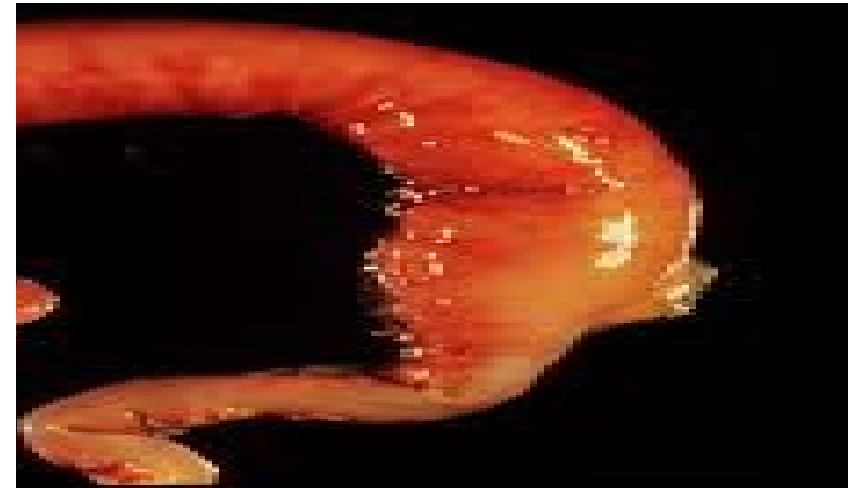
Gross:

- Affects rectum & may extend proximally.
- Aganglionic distal segment is contracted.
- Proximal bowel becomes dilated

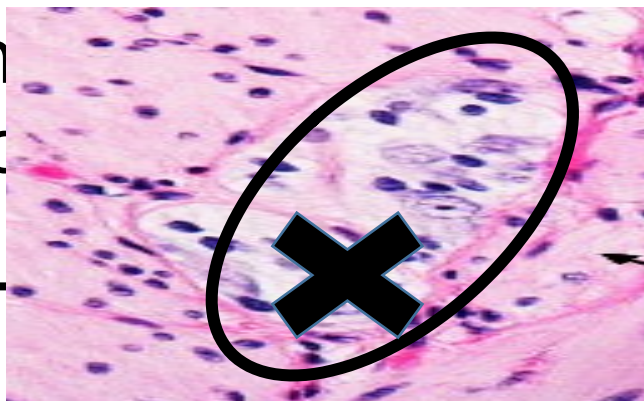
Diagnosis:

Rectal biopsy demonstrates **absence** of ganglia

Treatment: Resection of aganglionic segment



<https://image.slidesharecdn.com/grossingbowel-131029125815-phpapp02/95/gross-large-bowel-dr-n-p-tiwari-26-638.jpg?cb=1383051549>



Meckel's diverticulum ,Malabsorption, Hirschsprung's disease (Quiz)



1.Hirschsprung's disease

2.Celiac disease

3.Meckel's diverticulum

4.Whipple disease

- a. Incomplete obliteration of vitello-intestinal duct
- b. T cells reaction & antibodies produced against Gluten
- c. Periodic acid-Schiff (PAS-positive) macrophages in intestinal mucosa
- d. Aganglionic distal segment with functional obstruction
- e. Heterotopic tissue : gastric, pancreatic or biliary tissue.

Meckel's diverticulum ,Malabsorption, Hirschsprung's disease (Quiz)



1.Hirschsprung's disease

c

2.Celiac disease

e

3.Meckel's diverticulum

a,d

4.Whipple disease

b

- a. Incomplete obliteration of vitello-intestinal duct
- b. Periodic acid-Schiff (PAS-positive) macrophages in intestinal mucosa
- c. Aganglionic distal colonic segment with functional obstruction
- d. Heterotopic tissue : gastric, pancreatic or biliary tissue.
- e. T cells reaction & antibodies produced against Gluten

Acute Appendicitis



Def:

Acute inflammation of appendix :catarrhal or suppurative.

Pathogenesis:

a-Obstruction of lumen & interference with normal peristaltic drainage due to:

- Foreign material
- Less commonly gall stone, tumor or mass of worms.

b-Ischemic injury leads to :

stasis of luminal contents >favour bacterial proliferation> trigger inflammation.

C/P:

- Periumbilical pain localizes to right lower quadrant.

Acute Appendicitis



1. Acute catarrhal appendicitis

edematous & congested

2. Acute suppurative appendicitis

- Lumen: filled with purulent exudates
- Mucosa: focal ulcerations
- Serosa : covered by fibrinopurulent exudate.

3. Acute gangrenous appendicitis

friable & surface coated with greenish-black gangrenous necrosis



<https://image.slidesharecdn.com/presentation1-130228094139-phpapp01/95/appendix-gr-638.jpg?cb=1479456030>



https://live.staticflickr.com/7250/7796703918_8f5ae54b08_b.jpg

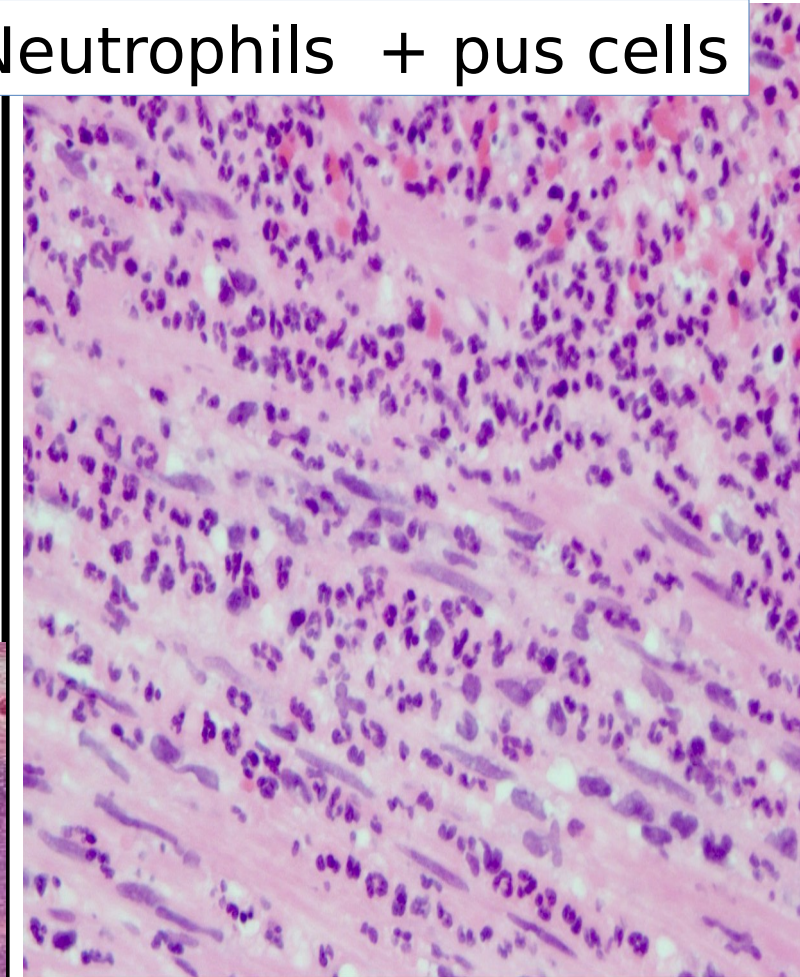
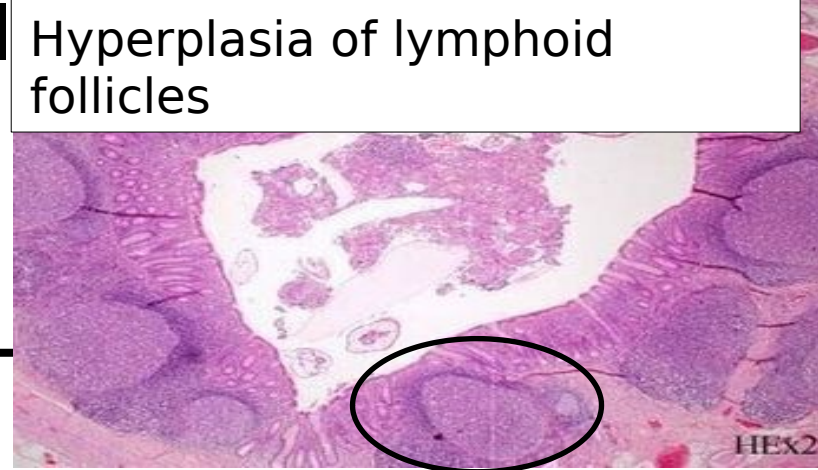
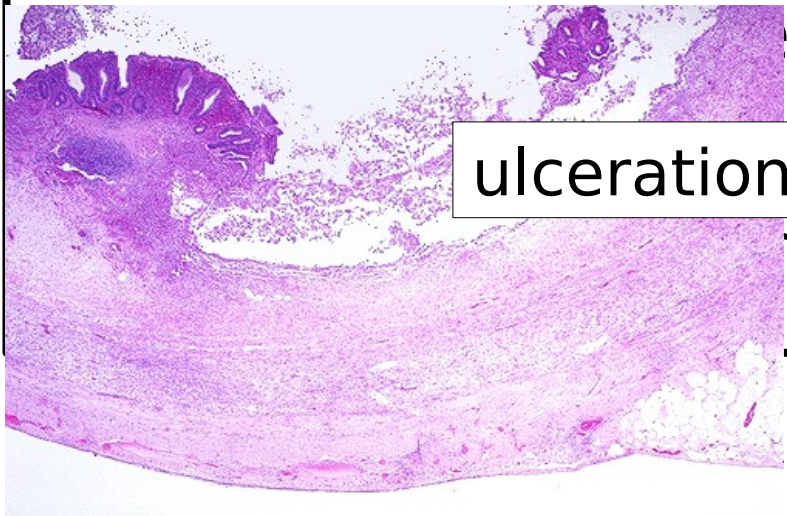
Acute Appendicitis



Mic :

- Lumen : Filled with necrotic material
- Mucosa : Ulcerations
Hyperplasia of lymphoid tissue
- Wall : Transmural Infiltration by neutrophils &

Neutrophils + pus cells



Acute Appendicitis



Effects & Complications:

1. Perforation: with generalized suppurative peritonitis.

2. Chronic appendicitis

2. Appendicular mass:

Mass of inflamed tissue surrounding inflamed and/or ruptured appendix.

3. Appendicular abscess:

rupture of an appendix >> localized abscess in right iliac fossa.

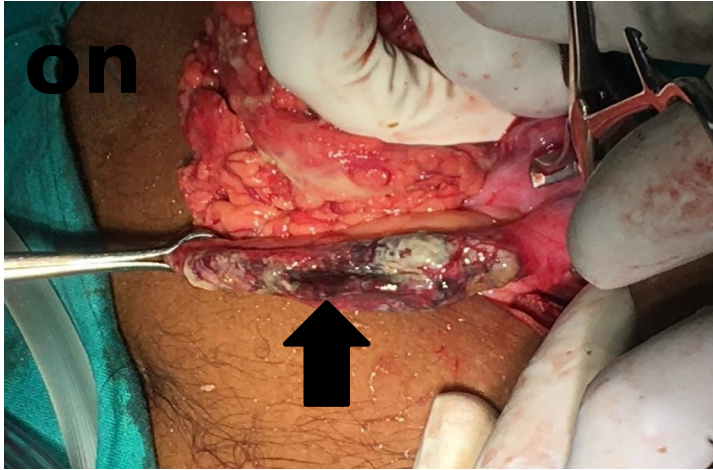
4. Portal pyemia : due to Septic thrombophlebitis leading to septic emboli

5. Fistulous formation: rare, appendicular mass or abscess

Acute Appendicitis

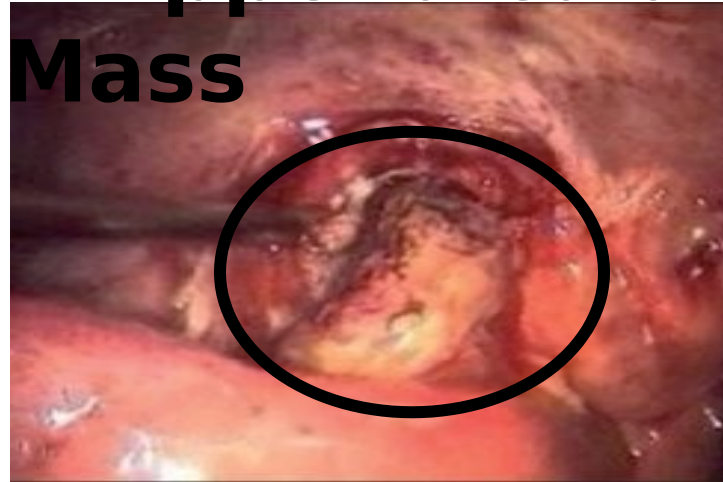


1. Perforation



https://www.researchgate.net/profile/Shouptik_Basu/publication/327532709/figure/fig1/AS:668563484442636@1536409364330/Appendicular-Perforation.jpg

2. Appendicular Mass



https://www.researchgate.net/publication/51080030/figure/fig3/AS:202690819825674@1425336665835/Appendicular-mass-and-gangrenous-appendix_Q320.jpg

3. Appendicular abscess



<https://i.ytimg.com/vi/SRMOKtFZim0/maxresdefault.jpg>

4. Portal Pyemia



<http://www.fao.org/3/t0756e/T0756E32.jpg>

5. Appendicular fistula



https://www.researchgate.net/profile/Sarath_Sistla/publication/27796438/figure/download/fig2/AS:669467273093143@1536624844937/Appendix-adhered-to-module

6. Mucocele



<https://encrypted-tbn0.gstatic.com/images?q=tbn:AND9GcQqckLR4KjKMvTLvD8IAYPwvn9IL4USc1FID56Z5Ssh2qBka9qNrQ>

Tumours of Appendix



1. Carcinoid tumour

- Commonest site in GIT is appendix
- Arise from neuroendocrine cells (argentaffin cells)
- Gross: mostly at tip as a circumscribed yellowish nodule
- Mic : refer to stomach tumours



<https://d1yboe6750e2cu.cloudfront.net/i/8dd40ac9316cb4b6c597b2461eafc6b368084e04>



1. Carcinoid tumour (cont.)

- **Behaviour:**

- Grows slowly
- Low grade malignant tumour
- May Metastasize to liver & LNs
- Carcinoid syndrome: occurs in tumors metastasizing to liver due to secretion of **5-hydroxytryptamine or serotonin**
(refer to stomach tumours for symptoms)

2. Mucinous cystadenoma. **3. Carcinoma** is very rare

Bleeding Per Rectum



Def:

Passage of blood in stools = **Intestinal hemorrhage**

Causes :

1-Intestinal

- Piles (very common)
- Polyps
- Tumor
- Anal fissure (very common)
- Inflammation :T.B, Ulcerative colitis ,Crohn's , Bilharzial dysentery etc.

2-Bleeding Tendency: eg :Purpra Leukemia Vit K

Meckel's diverticulum ,Malabsorption ,Hirschsprung's disease & Appendicitis (Quiz)



A Barium meal in a 20 year old male reveals a blind pouch communicating with the lumen of gut about 90 cms from the ileocecal valve

- a. What is the most likely diagnosis?**
- b. What is the explanation of the acute abdomen?**

**Meckel's diverticulum
Diverticulitis -Perforation – Volvulus &
intussusception**

Meckel's diverticulum ,Malabsorption ,Hirschsprung's disease & Appendicitis (Quiz)



A mother comes complaining that her new born infant does not pass stools till now .X -ray reveals dilatation of the colon proximal to a stenotic area . Which of the following is the most likely diagnosis?

- a. Appendicular mass
- b. Celiac disease
- c. Meckel's diverticulum
- d. Hirschsprung's disease
- e. Whipple's disease

Meckel's diverticulum ,Malabsorption ,Hirschsprung's disease & Appendicitis (Quiz)



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- a. Appendicular mass
- b. Celiac disease
- c. Meckel's diverticulum
- d. Hirschsprung's disease**
- e. Whipple's disease



- Meckel's diverticulum is a congenital anomaly of small intestine
- Celiac disease is due to sensitivity to gluten leading to malabsorption
- Hirschsprung's disease is a congenital anomaly due to absence of ganglion cells in a distal colonic segment
- Acute appendicitis: causes and complications
- Commonest site of carcinoid in GIT is appendix



Suggested Textbooks



- Kumar V, Abbas A, Aster J : In Robbins and Cotran pathologic basis of disease, 10th edition. Elsevier Saunders. Chapter 16
- <http://library.med.utah.edu/WebPath/GIHTML/GI020.html>
- <http://www.pathologyoutlines.com/stomach.html>